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TITLE: Can Degradation of Performance by Fatigue be Predicted by Mechanical Tasks Involving Pupil, Somatic, and Extra-Ocular Muscle Function?

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13. ABSTRACT (Maximum 200 Words)
After a series of significant delays beyond our control we have obtained the necessary equipment to do the studies. We have written software that allows the computer controlling the stimuli to interact with the separate computer recording eye movements. This is necessary, as our proposal requires making the stimuli progressively difficult and dependent on the exact position of the eyes. We have begun testing subjects outside of the protocol to refine the testing paradigm. We expect to begin testing subjects during the control phase of the testing within a few weeks and with sleep deprivation shortly thereafter.

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INTRODUCTION

The overall goal of our project is to improve our ability to detect physiologic changes due to fatigue that might impede one's ability to perform their mission. Previous work has documented some abnormalities in pupil and oculomotor function using simple tasks. Our hypothesis is that saccadic eye movement and pupillary abnormalities caused by fatigue will be detected more readily using tasks of increasing complexity. We suspect that the greater degradation in performance will allow a greater separation between levels of fatigue rather than simply separate normals from fatigued subjects. We further expect that different testing parameters will better predict impairment for different physiologic tasks. For example, saccadic velocity measurements may correlate better with impairment of balance while accuracy and efficiency may correlate better with impairment of judgment.

BODY

There were a series of strikingly long and frustrating delays before we were able to obtain the equipment that we need to do these studies. These included prolonged delays in getting the funding followed by longer delays in getter the necessary equipment. When the eye movement recording equipment was received it was not able to what it was supposed to do. Once we obtained them we found it required more time than anticipated to coordinate the stimulus generator with the eye and pupil recording equipment. The difficulties were increased as the company which provided the eye movement recording equipment has been delivering it in steps with "upgrades" most have which have required redoing the computer programs controlling the way the stimulus generator and recorder interact.

We can now easily test a number of saccade tasks, and have begun testing subjects outside of the protocol to refine the testing paradigm for the most difficult tasks. These have been the most difficult to program as these are a series of tests for which each task depends on how well the patient has performed the previous task.

KEY RESEARCH ACCOMPLISHMENTS

1. Identified and gathered the best equipment for accomplishing the project
2. Set up calibration procedures for the recording equipment
3. Developed the ability to coordinate stimulating and recording equipment
4. Designed and programmed stimulus programs for testing subjects

REPORTABLE OUTCOMES

At this time there are no reportable outcomes. Once testing has become formalized we hope that collection of data will progress rapidly as the subjects will be residents on call and there are residents on call every night.

CONCLUSION

We expect to begin testing subjects during the control phase of the testing within a few weeks and with sleep deprivation shortly thereafter.